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EP-9: J2157 Ultra-massive Black Hole

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Cosmos is full of secrets. The more secrets of it you uncover, the more secrets it presents in front of you. Black Holes are mysterious objects that we don't fully understand. We now know that Black Holes radiates in Hawking Radiation. We know how they are formed but still they fascinate us every time. Hi, I'm your host Maanvinder and today I will tell you about ultra-massive black hole J2157. I will take you into a deep dive about this black hole but before I start, first let's understand what Ultra-massive black holes are?

Black Hole is a place in space where gravity pulls so much that nothing can escape not even the light. If you want to escape from the immense gravitational force of a black hole then, the escape velocity which is the velocity needed to escape from the force of gravity of a planet or a star, etc; for such a object is greater than the speed of light. For instance, the escape velocity for Earth is 11.2 km/s. And according to Einstein's Theory of Relativity, nothing can travel faster than the light. So there's no chance of escaping from such a dense object. Ultra-massive black holes are more than 10 billion times the mass of our Sun. They are rare and can be wide as the entire solar system. They can weigh as much as all the star in our home galaxy. For example, TON 618 Ultras-massive black hole is the most massive black hole known to date with a mass of about 66 Billion Solar Masses, which is massive than an entire galaxy- "Triangulum Galaxy". These black holes can kill the entire galaxy in which they reside. Today our journey through cosmos has brought us to a new destination- J2157 Ultra-Massive Black Hole. Let's get started!!!

In 2018, astronomers at Australian National University (ANU) with the help of University's Siding Spring Observatory discovered something which shocked everyone. It was a ultra-massive black hole with earlier estimates suggesting it to be 20 solar masses. Later, new research led by the ANU astronomers found that this gargantuan black hole weighs 34 billion solar masses. The black hole name is J2157 or J2157-3602 and is located 1.2 billion light years from Earth. What surprised astronomers about this behemoth is one of the fastest growing black holes in the Universe. It devours a sun size star every day. It is getting bigger and thus it has been classified as the fastest growing Supermassive black hole in the Universe.

Research shows that this monster is growing at a rate of 1% every million years, which is a lot when it comes to its huge size. "J2157 is about 8000 times bigger than the black hole in the center of Milky Way (Sagittarius A*)," astronomer Christopher Onken of ANU, who was the part of the discovery team told Science Alert. He also added that "if the Milky Way's black hole wanted to grow that fat, it would have to swallow two thirds of all star in our galaxy".

J2157 is the monster of Universe. This kind of shish eating can have devastating consequences for the galaxy they reside in. Black holes like J2157 are the killers of galaxy. They blasts out so much energy and turbulence into the galaxy that it shut down the star formation taking place in the galaxy.

There's no clear answer to how these ultra-massive black holes were formed because the process of accretion of a black hole takes long time. Current models suggest it was formed when the universe was 1.2 billion years old only, which raises questions on how you can make black hole that big at a time when there was not enough gas and enough time. This challenges our current models on how black holes grow. If J2157 were to be formed after many small black holes merged into each other, then it raises a problem. As I earlier told you about the current model which suggest that it was formed 1.2 billion years after Universe came into existence. The problem in this case is that the process of black hole accretion would have taken a long time for such a large object to exist so early on. Astronomers are yet to figure out how these ultra-massive black holes were formed. What you can do until then is to listen or read our episodes!!!

Thanks for reading!

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